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Brief Communication

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Real-world insights from launching remote peer-to-peer mentoring in a safety net healthcare delivery setting

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ABSTRACT

Peer mentors have been proven to improve diabetes outcomes, especially among diverse patients. Delivering peer mentoring via remote strategies (phone, text, mobile applications) is critical, especially in light of the recent pandemic. We conducted a real-world evaluation of a remote diabetes intervention in a safety-net delivery system in New York. We summarized the uptake, content, and pre-post clinical effectiveness for English- and Spanish-speaking participants. Of patients who could be reached, 71% (n = 690/974) were enrolled, and 90% of those (n = 618/690) participated in coaching. Patients and mentors had a mean of 32 check-ins, and each patient set an average of 10 goals. 29% of the participants accessed the program via the smartphone application. Among participants with complete hemoglobin A1c data (n = 179), there was an absolute 1.71% reduction ($P < .01$). There are multiple lessons for successful implementation of remote peer coaching into settings serving diverse patients, including meaningful patient-mentor matching and addressing social determinants.

Key words: diabetes, peer coaching, digital health platforms, safety net healthcare systems, implementation science

INTRODUCTION

Diabetes self-management support through community health workers with lived experience or, more specifically, "peer mentors" is an evidence-based approach to enhance chronic disease outcomes, particularly in diverse patient populations.[1–7] Peer mentors have the same health conditions and similar backgrounds with the patients they serve. While there is variation in the specific tasks that peer mentors undertake, key components of care coordination, health coaching, social support, health assessment, resource linking, and health education are common,[8] often using tailored goal setting and action planning.[9]

Despite this evidence, peer mentoring has spread but has not yet been widely implemented as the standard of care in Medicaid populations.[10,11] For successful dissemination, there are multiple implementation barriers to address: 1) finding, training, and managing peer mentors to deliver coaching and support; 2) delivering evidence-based health education while tailoring content based on each individual's specific needs and preferences, particularly with respect to the social determinants of health; 3) activating existing clinical and community resources; and 4) scaling program delivery in cost-effective ways.[12–15]

Underscored by the COVID-19 pandemic, we also need a remote and digitally-enabled means to deliver peer mentoring. Not only can technology reach people at the right time and place, it has also become more ubiquitous overall since the start of the pandemic,[16,17] as it is currently the safest way to communicate. Within the broader digital health ecosystem, private sector solutions are particularly important to examine, as digital health companies may be better suited to cost-efficiently scale these technologies to multiple markets simultaneously.[18] Because real-world evidence about implementation of remote peer mentoring solutions is lacking (especially with respect to diverse populations),[19,20] we describe here early implementation and effectiveness data from the rollout at a large academic medical center.

MATERIALS AND METHODS

InquisitHealth is a remote, technology-enabled peer mentoring company that delivers chronic disease management longitudinally and one-on-one to patients, through telephonic and smartphone outreach in both in English and Spanish. The core educational content is based on up-to-date guidelines.[21,22] InquisitHealth recruits patients who are successfully managing their chronic conditions, trains them to provide education and support to others, and then matches them with similar patients who are not in clinical control. As these mentors gain more experience with coaching over time, they take on a larger of panel of patients with increasing complexity.

The Supplementary Appendix includes the overall flow of the InquisitHealth mentoring platform. In brief, clinical partners (eg, health plans, health systems) securely share with InquisitHealth data on patients with poorly controlled diabetes. InquisitHealth then initiates a multichannel outreach campaign (via interactive voice response, mail, letter) to each patient, leading to: 1) a phone conversation to enroll patients (in English or Spanish), 2) matching patients with a mentor based on multiple shared attributes (eg, race/ethnicity, language, clinical profile (eg, use of insulin), common life experiences), and 3) a detailed health assessment of each patient (including identifying necessary behavior changes and barriers from social determinants). The mentor and patient then connect remotely for coaching via phone and text conversations. InquisitHealth's Mentor1to1 software platform, based on the health assessment and the readiness of each patient, guides the mentor to deliver tailored content and conduct goal-oriented conversations to help fill the patient's knowledge gaps, implement self-management behaviors, and overcome barriers. The peer mentors followed evidence-based approaches for their coaching, with at least 2 sessions per month for 6 months.[3] Mentors can also escalate certain medical or social issues to "experts" (eg, pharmacists, dietitians, or social workers; health plan managers; community-based programs) for phone or video-based consults with the patient, or written guidance for the mentor. Finally, the program can mail educational resources to patients, as well as offer an optional patient-facing iPhone and Android application (app) that provides educational content, mentor chat functionality, a peer forum, and tracking of individual goals and check-ins.

Implementation at Montefiore Health System

InquisitHealth was implemented at Montefiore Health System, a large integrated healthcare delivery system serving over 3.2 million residents of the Bronx and the Hudson Valley. The healthcare system's priority to better manage patients with chronic conditions, as well as its multiple value-based and full-risk contracts, led Montefiore to seek out vendors for diabetes management.

To enroll patients with diabetes into the InquisitHealth program, Montefiore shared diabetes registry information (those with poorly-controlled or unknown control status from recent HbA1c data). Because data were refreshed monthly, InquisitHealth was able to reach out to all patients as well as add new patients over time. After an initial successful pilot, Montefiore set a goal to enroll 500 additional patients between 2017 and 2018.

After the implementation of this program and data collection, InquisitHealth and Montefiore partnered with *UCSF S.O.L.V.E. Health Tech*, an initiative that evaluates digital health technology solutions for diverse, low-income patients in order to independently explore their impact.

Analysis

First, we described the enrollment of patients, documenting reasons for exclusion or drop out at every step. We used descriptive statistics to summarize the demographic and health characteristics of enrolled patients in comparison to those unenrolled or not reached. Demographic and health characteristics of patient age, gender, race/ethnicity, insurance type, Charlson comorbidity index (estimating total patient-level burden across major chronic diseases),[23] and utilization of outpatient and inpatient visits within the previous 12 months were extracted from the Montefiore electronic health record (EHR) system. We compared enrolled vs unenrolled/unreached participants using 2-sample t-tests for continuous variables and chi-squared tests for categorical variables.

Next, we examined those who engaged with and completed the peer mentoring program. We descriptively summarized the type and frequency of a) number of mentor–patient contacts (total phone calls and check-ins, which are structured responses to patient status questions captured via phone, text, or in-app); and b) coaching topics covered and documented on the app to monitor coaching progress.

Finally, we examined the changes in HbA1c, focusing on participants who engaged in the peer mentoring program. The baseline vs follow-up HbA1c test results were examined in a pre-post comparison using a paired t-test, comparing results within 3 months prior to program enrollment to 12 months post program completion. In secondary analyses, we a) reported the total proportion with HbA1c $< 9\%$ at follow-up, b) expanded baseline HbA1c to include results from more than 3 months before program enrollment and c) reported the number of patients without a baseline HbA1c but with a *new* HbA1c test post enrollment. Finally, in exploratory subanalyses, we examined the HbA1c improvements by patient race/ethnicity, insurance type, and comorbidity status.

This work was approved by the UCSF Institutional Review Board (#19-28839).

RESULTS

From a total patient list of 4156 patients, 618 patients enrolled in the program. The flowchart for real-world enrollment data is displayed in Figure 1. Of note, a large proportion of the 4156 patients were unable to be reached (51%) or ineligible (26%, as they were no longer a patient at the healthcare system or had a new HbA1c $\leq$ 9%). Of those reached, 71% (n = 690/974) were enrolled in the program, and 90% of those continued into the coaching program (n = 618/690).

The overall patient sample (Table 1) was primarily nonwhite (79%), experienced high levels of comorbidities (77% had a comor-

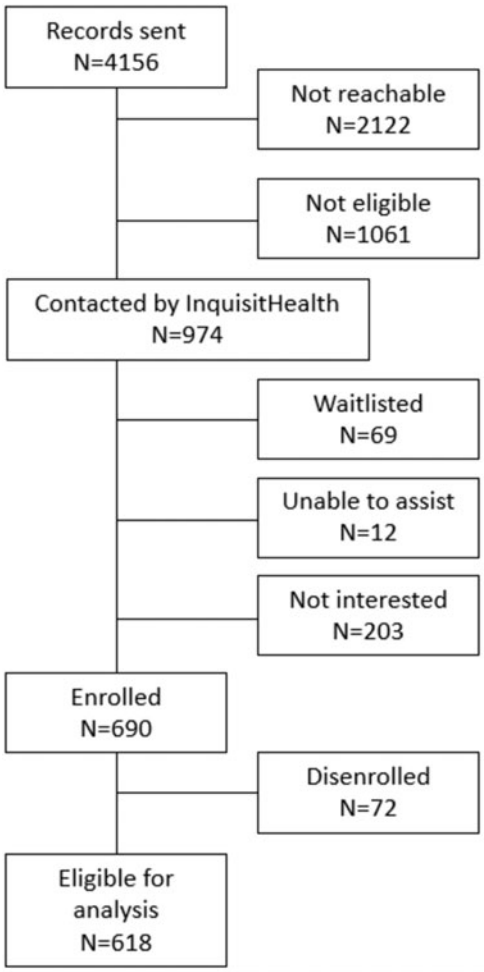

Figure 1. Real-time enrollment into InquisitHealth peer coaching program.

bidity score of ≥ 3), and had a mix of payer/insurance types (26% commercial, 11% Medicaid, 57% Medicare). There were few statistical differences comparing enrolled vs unenrolled/unreached patients: enrollees were slightly younger (mean age 63 vs 65 for unenrolled/unreached), more likely to be female (63% vs 55% unenrolled/unreached), and had a different racial/ethnic composition (with higher proportions of African American patients enrolled vs unenrolled/unreached (51% vs 40%) and lower proportions of Hispanic/Latinx enrolled vs unenrolled/unreached (23% vs 30%)). Mentor characteristics (age, gender, race/ethnicity, language) are also displayed in Table 1.

Patients and mentors, on average, had 32 check-ins and 20 phone calls (with average of 278 minutes of live coaching per dyad) over an average of 12 months. Each patient, on average, set 10 self-management goals, with a wide range of coaching topics covered (Table 2). Overall, 85% of coaching topics related to diabetes and lifestyle, 11% related to the social determinants of health, and 4% of issues needed escalation back to the healthcare system for resolution. These discussions often covered diabetes principles (17%), diet (18%), and exercise (11%) topics, but mental health issues (11%) and care coordination for appointments (15%) were also frequent. Of the 4% of topics escalated back to the health system, most were medical in nature (eg, appointments, medications).

Within the sample, 180 patients (n = 29% of the enrollees) both had access to a smartphone and utilized an optionally available iPhone/Android app to view educational materials, chat with their mentor, schedule/reschedule calls, complete check-ins, and update their goals. Finally, 12% of the enrolled participants completed the program in Spanish.

179 individuals had a relevant pre- and post-HbA1c lab test available from the EHR for evaluating clinical effectiveness in our primary analysis (Table 3). There was an absolute 1.71% reduction in HbA1c values ($P < .01$), and 42% had HbA1c < 9% at follow-up. The HbA1c improvements were robust among the largest racial/ethnic groups (−1.79% for n = 98 Black participants, −1.51% for n = 47 Hispanic/Latinx participants, and −1.36% for n = 10 White participants), as well as for insurance type (−1.79% Medicare [n = 98], −1.42% commercial patients [n = 61], and −1.59% Medicaid [n = 10]) and comorbidity (−1.94% for Charlson score 0–2 [n = 32] and −1.60% for Charlson ≥ 3). When including all available baseline HbA1c results (n = 300), the HbA1c reduction attenuated to 1.51% ($P < .01$). Finally, among the 244 patients without baseline HbA1c, 44% received a new test result.

DISCUSSION

This case study summarizes the real-world implementation and effectiveness data of a technology-enabled diabetes peer-mentoring program implemented by a digital health company within a large healthcare system. Overall, the program showed substantial uptake, with over 70% of those contacted enrolling. There also was high enrollment in the peer-mentoring program among racial/ethnic minorities (83% identified as non-White race/ethnicity) and those with a high comorbidity burden (79% having ≥ 3 chronic illnesses in the EHR), in contrast to many previous published digital health studies.[20] Overall, only 29% of the program enrollees utilized the smartphone app (the remainder using phone calls only), highlighting the need for multiple modalities in chronic disease peer coaching programs.

The significant improvement in HbA1c among those enrolled in the program was robust, building upon the peer coaching literature. Previous studies have found that peer mentors must maintain relational elements within their coaching programs[3,4,24–26] and be well-matched with their coached patients.[7] This study of InquisitHealth outlined several concrete functionalities and processes to deliver peer coaching entirely remotely via phone/digital modalities, making these findings especially important during the time of COVID-19. The importance of combining non-technical (ie, phone) and more technical (ie, app features) options for participants was particularly important for this population and supports previous literature asserting that peer coaching with and without digital coaching are equally effective.[6]

Limitations of this study include a single healthcare delivery system and lack of a comparison group for the pre-post HbA1c analyses.

In summary, our study demonstrates several key lessons, aligned with previously published implementation outcome frameworks to help move digital health tools into wider adoption and spread.[19,27] First, there appeared to be successful alignment of the digital health company's mission/values and business plan to serve the diverse population at Montefiore, as evidenced by: the focus on social determinants of health (in addition to traditional diabetes education), careful attention to language access, flexibility according to the digital and health literacy needs of end users, and heightened attention to peer-matching of mentors and patients by characteristics such as

Table 1. Peer mentoring patient and mentor characteristics

Patient characteristics Race/ethnicity, n (%)	Total (n = 4156)	Not enrolled (N = 3538)	Program Participants (N = 618)	*P* value
Mean age (s.d.)	64.4 (13.9)	64.7 (14.2)	62.8 (12.1)	.002
Female, n (%)	2324 (56)	1932 (55)	392 (63)	<.001
Race/Ethnicity, n (%)				<.001
Black	1735 (42)	1417 (40)	318 (51)	
Hispanic/Latinx	1200 (29)	1055 (30)	145 (23)	
White	317 (8)	282 (8)	35 (6)	
Asian	74 (2)	69 (2)	5 (1)	
Other	254 (6)	209 (6)	45 (7)	
Missing/Unknown	576 (14)	506 (14)	70 (11)	
Mean A1c at baseline (s.d.)	10.5 (1.80)	10.4 (1.81)	10.5 (1.77)	.32
Mean inpatient utilization in previous 12 months (s.d.)	0.58 (1.30)	0.60 (1.33)	0.48 (1.14)	.05
Mean primary care utilization in previous 12 months (s.d.)	3.76 (4.2)	3.73 (4.3)	3.94 (3.8)	.27
Charlson comorbidity index, n (%)				.27
0	38 (1)	30 (1)	8 (1)	
1–2	902 (22)	779 (22)	123 (20)	
3–4	940 (26)	802 (23)	138 (22)	
5–6	985 (24)	820 (23)	165 (27)	
7–8	499 (12)	414 (12)	85 (14)	
≥ 9	292 (7)	268 (8)	24 (4)	
Unknown	500 (12)	425 (12)	75 (12)	
Insurance status, n (%)				.53
Commercial	1088 (26)	913 (26)	175 (28)	
Medicaid	449 (11)	380 (11)	69 (11)	
Medicare	2352 (57)	2014 (57)	338 (55)	
Missing	267 (6)	231 (7)	36 (6)	
Mentor characteristics (n = 76)				
Mean age (s.d.)	58.9 (10.9)			
Female, n (%)	60 (79)			
Race/Ethnicity, n (%)				
Black	27 (36)			
Hispanic/Latinx	14 (18)			
White	15 (20)			
West Indian	14 (18)			
Other	6 (8)			
Spanish speaker	13 (17)			

Abbreviation: s.d., standard deviation.

Table 2. Categories and distribution of social determinants of health issues during mentoring sessions

Total number of issues addressed = 4192	Diabetes or lifestyle behavior issue addressed (n = 3557)	Social determinants issue addressed (n = 451)	Issues escalated to health system for additional intervention (n = 184)
Diabetes principles	717	–	–
Diet	741	40	–
Medications	290	75	45
Blood sugar monitoring	291	58	41
Appointments	642	103	63
Loss of insurance coverage	2	41	7
Mental health/stress	368	95	15
Exercise	465	–	–
Other health conditions	40	–	–
Housing	–	31	7
Transportation	–		6
Alcohol, smoking, substance use	1	8	–

Table 3. Improvement in A1c (Control or Measurement) among participants

	N	A1c change
Primary cohort: Mean change in HbA1c	179	−1.71
Secondary Analyses		
Primary cohort: Proportion HbA1c < 9% at follow-up	179	42%
Primary cohort + patients with outdated baseline HbA1c	300	−1.51
Proportion of participants with no/outdated baseline HbA1c values receiving follow-up HbA1c after coaching	244	44%

medical and social experiences. Second, there was a transparency of data sharing from both the healthcare system perspective (real-time and often messy lab data collected via the health system) and from InquisitHealth (raw data about patients reached, enrolled, and mentored). Third, it is critical in this type of partnership to focus on both internal validity and effectiveness (HbA1c improvement), as well as implementation process—that is, reach and engagement (eg, number of calls/contacts) overall and among key patient subgroups.[15,19,28,29] Too often, pilots are overly focused on effectiveness among a narrow group of enrolled participants which could represent selection bias among healthier or "worried well" individuals taking advantage of new remote/digital solutions first.[30] Moving forward, more real-world evaluations are needed to unpack the successful components for widespread dissemination, especially the rich insights for the remote care of diverse populations in the time of COVID-19.

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AUTHOR CONTRIBUTIONS

CL and AP conceived of the study with input from US and UP. CL designed the study and drafted the manuscript with input from all authors. AP conducted the analysis with input from CL. All authors critically revised the manuscript, approved the final version, and agree to be accountable for all aspects of the work.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Journal of the American Medical Informatics Association* online.

CONFLICT OF INTEREST STATEMENT

InquisitHealth funded this work via a sponsored research agreement with the University of California, San Francisco. All authors adhered to academic publishing standards during study design, data analysis, and presentation of results.

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